

SPACE DEBRIS SYMPOSIUM (A6)
Space Surveillance, Legal Aspects and Space Debris Modelling (5)

Author: Mr. Brian Weeden
Secure World Foundation, United States, bweeden@swfound.org

Dr. T.S. Kelso
Center for Space Standards and Innovation (CSSI), United States, tskelso@centerforspace.com

ANALYSIS OF THE TECHNICAL FEASIBILITY OF BUILDING AN INTERNATIONAL CIVIL
SPACE SITUATIONAL AWARENESS SYSTEM

Abstract

The rapid rise in the amount of debris in Earth orbit, coupled with the increasing number of actors placing satellites in orbit, has created concerns about the long term sustainability of Earth orbit. The collision between two satellites in February 2009 highlighted the existing gaps in data needed by all space actors to operate their satellites in a safe and secure manner. In a non-military application, this data, known as space situational awareness (SSA), consists of positional data on objects in Earth orbit and information on space weather.

Currently, many States have space surveillance sensors capable of tracking objects in Earth orbit. Some private or university actors even maintain a tracking capability. Out of these, only a handful have networks of several sensors, and only one - the United States - has attempted global coverage. The two main limitations are the economic cost of building and maintaining the sensors and politically viable locations that could host the sensors. Some States also have some existing capabilities to monitor, predict and warn about space weather events that could damage or destroy satellites, but few actively share this data. In addition to the data, analytical tools and trained personnel are required to enable sound decision-making.

The concept of an international civil space situational awareness network has been proposed as a possible solution to this issue. The network would consist of a voluntary sharing of data from SSA sensors by participating States and private actors towards a central data clearing house. This data would then be shared with all participants, enabling each to perform their own analysis and decision-making. For those actors without indigenous analytical capabilities, the data clearing house would also offer analytical services.

This paper catalogs the global pool of optical and radar sensors that could contribute to such a system and evaluates if they are significant for global coverage, or if additional sensors are needed. It also analyzes the technical issues involved with pooling data from these sensors, including centralized tasking, sensor calibration, data security, data format standards, and analytical tools and training. Finally, this paper provides a technical foundation for an international civil SSA system and highlight areas where further technical research and analysis are needed.